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Research Note

Persistence of the Component Parasite Community of Yarrow's Spiny Lizard, *Sceloporus jarrovii*, 1967–1991

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ABSTRACT: Persistence of the component parasite community of *Sceloporus jarrovii* was examined from samples taken 22 yr apart. Of the nematodes recovered, *Spauligodon giganticus* represents a core species; *Physaloptera retusa, Thubunaea intestinalis, Oochoristica scelopori,* and *Mesocestoides* sp. are satellite species. Species composition, prevalences, and intensities were similar after 22 yr, suggesting a persistent helminth component community.

KEY WORDS: *Sceloporus jarrovii,* Phrynosomatidae, *Physaloptera retusa, Spauligodon giganticus, Thubunaea intestinalis, Oochoristica scelopori, Mesocestoides* sp., helminth community.

Parasite community structure is hierarchical: a parasite infrapopulation represents all members of a single species of parasite within an individual host (Esch et al., 1975), a parasite infracommunity includes all of the infrapopulations within an individual host (Bush and Holmes, 1986), and a component parasite community represents all of the infracommunities within a given host population (Holmes and Price, 1986). A component parasite community is composed of core species, those species that occur with relatively high frequencies (prevalences) and densities (mean intensities), and satellite species, which occur with less frequency and are relatively less numerous than core species (Hanski, 1982).

Persistence, a measure of continued presence, and stability, a measure of constancy over time (see Meffe and Minckley, 1987), of helminth infections in lizards have been infrequently reported (Telford, 1970; Goldberg and Bursey, 1990b; Bursey and Goldberg, 1991, 1992). In this note, we present data on the component helminth community in samples taken 22 yr apart from a population of Yarrow's spiny lizard, *Sceloporus jarrovii* Cope. This phrynosomatid lizard (see Frost and Etheridge, 1989, for revised taxonomy of iguanian lizards) is restricted to the mountains of southeastern Arizona (Stebbins, 1985). Goldberg and Bursey (1990a) provided a list of the helminth fauna of *Sceloporus jarrovii.*

Specimens of *Sceloporus jarrovii* were collect-

ed by hand-held noose at Kitt Peak (31°95′N, 111°59′W; elevation 1,889 m) in the Baboquivari Mountains, Pima County, Arizona. A total of 489 lizards collected from October 1967 to January 1970 from elevations 1,730–1,884 m and 50 specimens collected October 1991 at 1,889 m elevation, representing 21 monthly samples, were examined for helminths. The 1967–1970 specimens were deposited in the Department of Biology Vertebrate Collection at Whittier College, Whittier, California. The 1991 specimens were deposited in the herpetology collection of the Natural History Museum of Los Angeles County (LACM Nos. 139668–139717).

The body cavity was opened and the gastrointestinal tract was excised by cutting across the esophagus and the rectum. The digestive tract was slit longitudinally and examined under a dissecting microscope. Each helminth was removed to a glass slide and identified using a glycerol wet-mount procedure; selected nematodes were stained with iodine, and selected cestodes were stained with hematoxylin. Representative specimens were deposited in the U.S. National Parasite Collection (Beltsville, Maryland 20705). Terminology use is in accordance with Margolis et al. (1982).

Three nematode species (*Spauligodon giganticus* (Read and Amrein, 1953), *Physaloptera retusa* Rudolphi, 1819, and *Thubunaea intestinalis* Bursey and Goldberg, 1991), 2 cestode species (*Mesocestoides* sp. and *Oochoristica scelopori* Voge and Fox, 1950), and a juvenile acanthocephalan were recovered (USNM Helm. Coll. Nos. 80867, 82468; 80868, 82467; 80869, 82468; 80870, 82469; 80871, 82470; 80877, respectively). Specific comparison of helminth species presence/absence and intensity was made for the October 1968, 1969 ($N = 21$, 26, respectively) and October 1991 ($N = 50$) samples, and no significant differences were found: Jaccard coefficient = 1; Morisita's Index = 0.995; Kruskal-Wallis statistic = 2.61, 2 df, $P > 0.05$.

Of the 539 lizards examined, 514 (95.4%) were infected and harbored 12,710 helminths. From an infrapopulation/infracommunity perspective, 282 (52.3%) lizards were infected with a single species of parasite (mean intensity = 18.0, range 1–258): 274 with *S. giganticus*, 5 with *P. retusa*, 2 with *O. scelopori*, and 1 with *Mesocestoides* sp. One hundred ninety-one (35.4%) were infected with 2 species of parasites (mean intensity = 32.1, range 2–279): 134 were infected with *S. giganticus* and *P. retusa*, 43 with *S. giganticus* and *O. scelopori*, 8 with *S. giganticus* and *T. intestinalis*, 3 with *S. giganticus* and *Mesocestoides* sp., 2 with *P. retusa* and *O. scelopori*, and 1 with *S. giganticus* and a juvenile acanthocephalan. Forty (7.4%) were infected with 3 species of parasites (mean intensity = 29.8, range 5–124): 15 with *S. giganticus*, *P. retusa*, and *O. scelopori*; 12 with *S. giganticus*, *P. retusa*, and *Mesocestoides* sp.; 7 with *S. giganticus*, *P. retusa*, and *T. intestinalis*; 4 with *S. giganticus*, *T. intestinalis*, and *O. scelopori*; 2 with *S. giganticus*, *P. retusa*, and a juvenile acanthocephalan; and 1 with *S. giganticus*, *O. scelopori*, and *Mesocestoides* sp. A single lizard was infected with 4 species (intensity = 68): *S. giganticus*, *P. retusa*, *O. scelopori*, and *Mesocestoides* sp. Helminths were not recovered from 25 (4.6%) lizards.

From a frequency of occurrence perspective, 505 (93.6%) lizards were infected with *S. giganticus*, 173 (32.1%) with *P. retusa*, 19 (3.5%) with *T. intestinalis*, 68 (12.6%) with *O. scelopori*, 18 (3.3%) with *Mesocestoides* sp., and 3 (0.5%) with juvenile acanthocephalans. In the 34 lizards not infected with *S. giganticus*, 25 were those not infected, 5 were infected with *P. retusa* only, 2 with *O. scelopori* only, and 1 with *Mesocestoides* sp. only. The remaining lizard was infected with *P. retusa* and *O. scelopori*. Monthly prevalences for *S. giganticus*, *P. retusa*, *T. intestinalis*, *Mesocestoides* sp., and *O. scelopori* are shown in Figure 1.

From an abundance perspective, of the 12,710 helminths recovered, 10,388 (81.7%) were *S. giganticus*. There were 1,948 (15.3%) *P. retusa*, 75 (0.6%) *T. intestinalis*, 130 (1.0%) *Mesocestoides* sp., and 166 (1.3%) *O. scelopori*. Acanthocephalans appeared in the collection (<0.1%) only in July 1968 ($N = 2$) and September 1968 ($N = 1$). A Shannon diversity index of 0.848 was calculated. The *Sceloporus jarrovii* composite helminth community is depauperate with >75% of the individuals belonging to a single species.

Because core species are defined as those species that occur with relatively high prevalence and mean intensity whereas satellite species occur with less frequency and are relatively less numerous than core species, we constructed a scatter plot of average monthly prevalence and average monthly mean intensity in order to categorize members of the component parasite community (Fig. 2). We would expect core species to appear in the upper-right quadrant of the graph and satellite species to appear in the other quadrants. *Spauligodon giganticus* was recov-

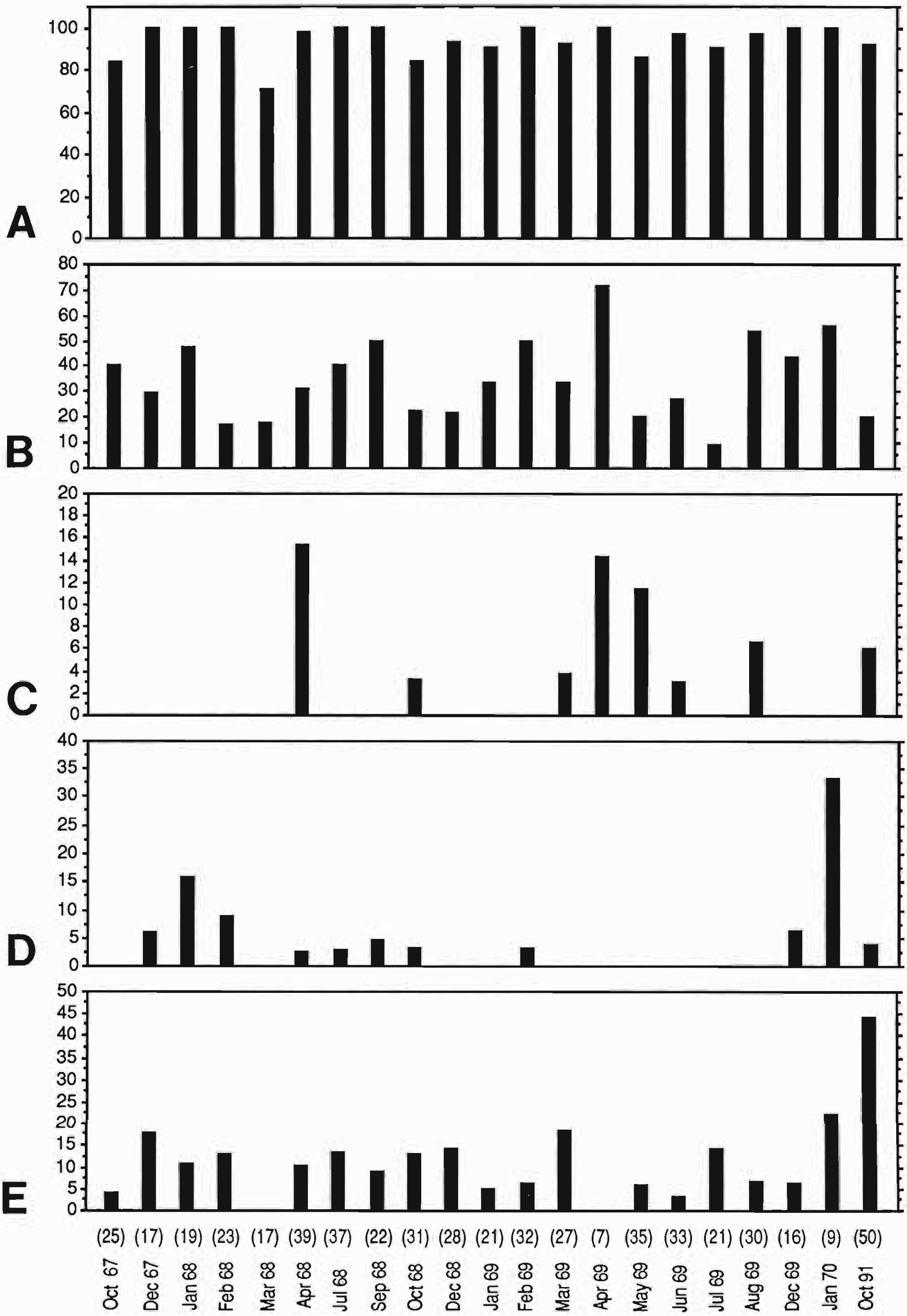

Figure 1. Monthly prevalences as percentages for *Spauligodon giganticus* (A), *Physaloptera retusa* (B), *Thubunaea intestinalis* (C), *Mesocestoides* sp. (D), and *Oochoristica scelopori* (E) recovered from 539 *Sceloporus jarrovii*. Numbers in parentheses are the number of lizards examined each month.

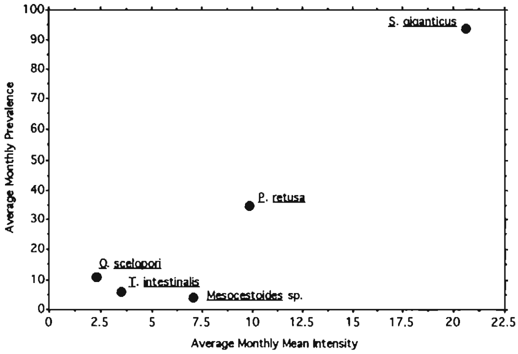

Figure 2. Scattergram of average monthly prevalence versus average monthly mean intensity of helminths from *Sceloporus jarrovii*. Core species appear in the upper-right quadrant of the graph.

ered from each of the 21 samples; average monthly prevalence was 94% (range 70.6–100), and average mean intensity was 20.6 (range 6.8–41.3). *Physaloptera retusa* was recovered from each of the 21 monthly samples; average monthly prevalence was 35% (range 9.5–71.4), and average mean intensity was 9.8 (range 1.4–47.3). *Thubunaea intestinalis* was recovered from 8 of the 21 samples; average monthly prevalence was 3% (range 0–15.4), and average mean intensity was 3.4 (range 1–10). *Oochoristica scelopori* was recovered from 19 of the 21 samples; average monthly prevalence was 11% (range 0–33), and average mean intensity was 2.3 (range 1–5). Tetrathyridia of *Mesocestoides* sp. were recovered from 11 of the 21 samples; average monthly prevalence was 4% (range 0–33), and average mean intensity was 7.4 (range 1–26.5). Acanthocephalans appeared in the collection only in July 1968 ($N = 2$) and September 1968 ($N = 1$). Based on Figure 2, *Spauligodon giganticus* is a core species within the composite helminth community of *Sceloporus jarrovii*. *Physaloptera retusa, Oochoristica scelopori, Thubunaea intestinalis,* and *Mesocestoides* sp. are satellite species. The acanthocephalans are incidental.

From an epizootiological perspective, the composite helminth community is composed of 1 core species and 4 satellite species. Persistence over a 22-yr period is demonstrated. *Spauligodon giganticus* develops directly, no intermediate host is necessary, and infection can occur from fecal contamination of the substrate (Telford, 1971). Infection of lizards can occur shortly after birth, and the life cycle of this oxyurid nematode is completed in less than 98 days (Goldberg and Bursey, 1992). Substrate licking by *Sceloporus jarrovii,* a well-documented behavior (De Fazio et al., 1977), may be primarily responsible for early infection of juvenile lizards and the high prevalence of *Spauligodon giganticus* seen in the adult lizard population. The other 4 parasites of the component helminth community presumably involve arthropod intermediate hosts. The life cycle of *Thubunaea intestinalis* has not been determined, but most spiruroids are associated with arthropod intermediate hosts (Olsen, 1974). Arthropods infected with third-stage larvae of *Physaloptera retusa* are the source of infection for lizards (Olsen, 1974). Intermediate hosts for *Mesocestoides* sp., although presumed to be an arthropod, have not been demonstrated (Webster, 1949). Linstowiine cestodes such as *Oochoristica scelopori* are known to develop in beetle intermediate hosts (Millemann and Read, 1953). Because *Sceloporus jarrovii* is insectivorous (Goldberg and Bursey, 1990c), the potential for repeated infection by these 4 helminth species depends primarily on the density of local insect populations.

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